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(54) Foam hand washing / disinfectant system

(57) The hand washing/disinfectant system of this invention comprises a dispenser and a hand washing/disinfectant solution. The dispenser has a convenient portable size that delivers a controlled amount of a non-aerosol foam. The hand washing/disinfectant solution is a water based, non-alcohol solution with a viscosity in the range of about 0 to about 200 cps and that has between about 0.01 to about 4% by weight of an active antimicrobial ingredient.

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Description

Background of the Invention

[0001] This invention relates to a foam hand washing/disinfectant system that allows a healthcare professional to disinfect his/her hands without the use of water or alcohol.

[0002] Hand washing by healthcare professionals is an essential component of infection control activities. However, studies from the Center for Disease Control show that compliance with hand washing protocol by healthcare professionals is unacceptably low. This is often attributed to the lack of a conveniently located soap/sink station, hand wash solutions that are inconvenient to use and, with continual use, that result in dry and chapped hands and the time consuming nature of the hand washing procedure.

[0003] Historically, there have been two main categories of hand washing procedures used by healthcare professionals. The first category is a full surgical scrub with a scrub brush and an antimicrobial solution. The active ingredient in such antimicrobial solutions typically is iodine, chlorhexidine gluconate, parachlorametaxylenol (PCMX), triclosan or hexachlorophenes. These solutions typically have a high surfactant and active ingredient content and thus must be rinsed off of the healthcare professional's hands with water in a sink station. A typical surgical scrub procedure takes about six minutes. The second category is hand washing with a traditional soap solution, with or without an antimicrobial agent. This procedure also requires a sink station so the healthcare professional can rinse the soap off of his/her hands with water.

[0004] Since sink stations are not always conveniently located, waterless hand washing solutions have been developed. These waterless hand wash solutions generally are alcohol based. They also tend to be fast acting efficacious and convenient. Unfortunately these waterless hand wash solutions can cause the healthcare professional's hands to become dry and chapped after repeated uses. Moreover, the alcohol-based solutions do not have long term residual antimicrobial efficacy and are flammable. In addition, the controlled delivery of liquid alcohol-based solutions is problematic. For example, a significant portion of the liquid alcohol-based solution can be wasted during the delivery of the solution to the healthcare professional. Where the liquid is poured onto the healthcare professional's hands, controlling the amount of the liquid that is dispensed is difficult and the delivered liquid can spill off of the healthcare professional's hands. Alternatively, where a spray bottle is used, up to 30% of the solution can be lost as mist. In both circumstances, decreased antimicrobial efficacy can result if insufficient amounts of the solution are used by the healthcare professional. Although, the delivery of solutions can be somewhat controlled if the solution is delivered as foam, the propellants that are required for such foam delivery can compromise the purity of the solution and are detrimental to the environment.

Summary of the Invention

[0005] It is therefore an object of the invention to provide a hand washing/disinfectant system that can be used by a healthcare professional without the need for a soap/sink station.

[0006] It is another object of this invention to provide a hand washing/disinfectant system that is quick and convenient to use.

[0007] It is still another object of this invention to provide a hand washing/disinfectant system that will not result in dry or chapped hands for the healthcare professional even after repeated use.

[0008] It is yet another object of this invention to provide a hand washing/disinfectant system that delivers a controlled amount of the hand washing/disinfectant solution to the healthcare professional.

[0009] It is even a further object of this invention to provide a hand washing/disinfectant system that delivers a non-aerosol hand washing/disinfectant solution foam to the healthcare professional.

[0010] The hand washing/disinfectant system of this invention comprises a dispenser and a hand washing/disinfectant solution. The dispenser has a convenient portable size that delivers a controlled amount of a non-aerosol foam. The hand washing/disinfectant solution is a water based, non-alcohol solution with a viscosity in the range of about 0 to about 200 cps and that has between about 0.01 to about 4% by weight of an active antimicrobial ingredient.

Detailed Description of the Invention

[0011] The dispenser that is used in the combination of this invention can be any available device that dispenses a non-aerosol air-liquid mixture, i.e. foam. Although a propellant could be used to create the foam, this is undesirable because such propellants contaminate the antimicrobial solution and may be harmful to the environment. Thus, a preferred dispenser should not use gas propellants but should instead create the foam by some other means, such as mechanical action. For example, such a dispenser may be obtained from Airspray International of Pompano Beach, Florida under the "Mini Foamer" designation. Such a dispenser delivers 0.4 g of foam for a single stroke. This allows

the delivery of a controlled dose of the active antimicrobial ingredient. See also U.S. Patent Nos. 5,337,929; 5,429,279 and 6,053,364, the disclosures of which are incorporated herein by reference. The antimicrobial solution that can be used with the dispenser in the combination of this invention should be foamable. This is because the foam evaporates more quickly when rubbed on the hands due to the increased surface area of the foam bubbles as compared to liquid or spray applied solutions. And the foam is easier to evenly distribute on the skin and is less likely to be spilled and wasted.

[0012] The antimicrobial solution that may be used in the hand washing/disinfectant system of this invention should have between about 0.01 to about 4% by weight of the active antimicrobial ingredient. For example, a diluted amount of any commercially available antimicrobial solution could be used in the system of this invention. These commercially available solutions should be diluted in water to between 1:20 and 1:100. It is important that these commercially available solutions be diluted in order to minimize the concentration of the surfactant and the active ingredient. Too high of a concentration will require the user to rinse her hands after using the antimicrobial solution in order to avoid skin irritation. Although dilution is important to avoid skin irritation, the amount of dilution should not adversely affect the antimicrobial efficacy of the antimicrobial solution. Commercially available antimicrobial solutions that have been diluted to between 1:20 and 1:100 results in a solution having an active ingredient concentration of between about 0.1% and about 0.2%. Surprisingly, this diluted solution will have a sufficient antimicrobial efficacy. In fact, the antimicrobial efficacy of the diluted version will be greater than the commercial version since the diluted version will not be rinsed off of the clinician's hands after use.

[0013] In addition, dilution is important because these commercially available antimicrobial solutions have a viscosity that is too high to allow them to be used with a non-aerosol foam dispenser. Preferably the viscosity should be between 0 and 200 cps, and even more preferably, the viscosity should be between 0 and 60 cps.

[0014] Commercially available solutions that meet the foregoing requirements are 4% or 2% chlorhexidine gluconate, 3% PCMX, 0.2% benzethonium chloride and 0.25% - 1% available iodine which may be obtained from Ecolab, Zeneca, Ballard Medical, Becton Dickinson, First Scientific or Xtrium. If 0.2% benzethonium chloride is used, it does not have to be diluted.

EXAMPLE 1

[0015] To illustrate the efficacy of the diluted base solution, seven commercially available anti-microbial solutions were diluted at 1:100. The study evaluated the antimicrobial efficacy of various solutions when challenge with ten different microorganism strains using an in-vitro time-kill method. The products were challenged with ten different microorganism strains utilizing 1 minute and 5 minute exposure times. The following table shows that the vast majority of the diluted base solutions were still effective as anti-microbial solutions.

Antimicrobial Efficacy - Kill Time Study Results									
		Zeneca - Hibiclens		BD 747		Hunting ton		Ballard	
		4% CHG		4% CHG		4% CHG		4% CHG	
		Time (in minutes)		Time (in minutes)		Time (in minutes)		Time (in minutes)	
Organism	Dilutions	1	5	1	5	1	5	1	5
K. pneumoniae	1:100	no growth	no growth	no growth	no growth	no growth	no growth	no growth	no growth
S. epidermidis	1:100	not tested	not tested	not tested	not tested	not tested	not tested	not tested	not tested
E. faecalis	1:100	not tested	not tested	not tested	not tested	not tested	not tested	not tested	not tested
S. aureus	1:100	no growth	growth	no growth	no growth	not tested	not tested	not tested	not tested
C, staphylococci	1:100	no growth	no growth	no growth	no growth	no growth	no growth	no growth	no growth
P. aeruginosa	1:100	no growth	no growth	no growth	no growth	no growth	no growth	no growth	no growth
C. albicans	1:100	no growth	no growth	no growth	no growth	no growth	no growth	no growth	no growth
E. coli	1:100	no growth	no growth	no growth	no growth	no growth	no growth	no growth	no growth
E. cloacae	1:100	no growth	no growth	no growth	no growth	no growth	no growth	no growth	no growth
S. marcescens	1:100	no growth	no growth	no growth	no growth	no growth	no growth	no growth	no growth
P. vulgaris	1:100	no growth	no growth	no growth	no growth	no growth	no growth	no growth	no growth

Antimicrobial Efficacy - Kill Time Study Results							
		BD		BD 205		BD 372405	
		3% PCMX		1% avail. Iodine		0.5% avail. Iodine	
		Time (in minutes)		Time (in minutes)		Time (in minutes)	
Organism	Dilutions	1	5	1	5	1	5
K. pneumoniae	1:100	growth	no growth	no growth	no growth	no growth	no growth
S. epidermidis	1:100	growth	growth	no growth	no growth	no growth	no growth
E. faecalis	1:100	growth	growth	no growth	no growth	no growth	no growth
S. aureus	1:100	growth	growth	no growth	no growth	no growth	no growth
C, staphylococci	1:100	not tested	not tested	no growth	no growth	no growth	no growth
P. aeruginosa	1:100	growth	growth	no growth	no growth	no growth	no growth
C. albicans	1:100	growth	growth	no growth	no growth	no growth	no growth
E. coli	1:100	grpwth	growth	no growth	no growth	no growth	no growth
E. cloacae	1:100	growth	growth	no growth	no growth	no growth	no growth
S. marcescens	1:100	no growth	no growth	no growth	no growth	no growth	no growth
P. vulgaris	1:100	no growth	no growth	no growth	no growth	no growth	no growth

[0016] Thus it is seen that a hand washing/disinfectant system is provided that can be used by a healthcare professional without the need for a soap/sink station, that is quick and convenient to use, that will not result in dry or chapped hands for the healthcare professional even after repeated use, and that will deliver controlled amounts of non-aerosol hand washing/disinfectant foam to the healthcare professional.

Claims

1. A combination foam dispenser and antimicrobial solution wherein the antimicrobial solution has an active ingredient concentration of between about 0.1% and about 0.2%.

2. The combination foam dispenser and antimicrobial solution of claim 1 wherein the antimicrobial solution has a viscosity in the range of between about 0- 200 cps.

3. The combination foam dispenser and antimicrobial solution of claim 2 wherein the foam dispenser dispenses the antimicrobial solution as a non-aerosol air-liquid mixture.

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EUROPEAN SEARCH REPORT

Application Number
EP 01 31 0009

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	WO 93 00089 A (PROCTER & GAMBLE) 7 January 1993 (1993-01-07) * claims 1,10,18 * * examples 2,3,5,8 *	1-3	C11D17/04 C11D3/48
X	WO 97 25408 A (KURTZ ET AL) 17 July 1997 (1997-07-17) * claims 1,14,16 * * page 15, line 14 - page 16, line 2 * * examples 3,4 *	1-3	
A	EP 0 990 412 A (BECTON DICKINSON CO) 5 April 2000 (2000-04-05) * page 2, line 46 - line 48 *	1-3	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7) C11D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	21 February 2002	Rasmusson, R

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 01 31 0009

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